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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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John S. Beulick Armstrong Teasdale LLP Suite 2600 One Metropolitan Square St. Louis, MO 63102				
EXAMINER				
AFZALI, SARANG				
ART UNIT		PAPER NUMBER		
3726				
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11/17/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/699,354

Applicant(s)

BENETEAU ET AL.

Examiner

SARANG AFZALI

Art Unit

3726

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Amendment filed 7/28/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 8-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The applicant's amendment filed on 7/28/2008 has been fully considered and made of record.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Randolph Jr. et al. (U.S. 6,453,211) in view of Applicant's Admitted Prior Art (AAPA), Burke et al. (US 6,508,000), Wang et al. (US 6,912,446), and Flowers et al. (US 6,084,196).
4. As applied to claim 1, Randolph Jr. et al. teach a method of repairing a damaged gas turbine blade comprising of the steps:

determining an airfoil reparability limit (the limit is the "permitted tolerances from the nominal configuration" in order to return the damaged blade to a near-original configuration, col. 4, lines 23-26);

determining a portion of titanium alloy material to be removed based on the determined airfoil reparability limit;

removing titanium alloy material from along leading and trailing edges of the airfoil, and along a radially outer tip of the airfoil to form respective leading edge and trailing edge, with each define cut-back depths;

depositing weld material onto the leading edge and trailing edge cut-backs; and removing at least some of the weld material to obtain pre-desired finished dimensions for the leading and trailing edges.

Note that Randolph Jr. et al. teaches (Fig. 3 and col. 2, lines 14-29 and col. 9, lines 44-54) the steps of determining a reparability limit, removing titanium material from the damaged area of the leading edge (42) of each blade (12b) based on the determined limit, step of depositing weld material onto the leading edge (42) of each blade (12b), and step of removing at least some of the weld material to obtain a desired finish for each blade (12b) and further teaches that the same procedure can be made on the trailing edge (44, Fig. 3, col. 9, lines 44-46) of each blade (12b).

Randolph Jr. et al. fails to explicitly teach the repair done on "a radially outer tip of the airfoil" or the "titanium weld material" or that the airfoil reparability limit defines a "maximum chord reduction and a minimum blade thickness."

AAPA teach a known method of repairing a turbine compressor blade including mechanically removing, such as by grinding a worn and/or damaged tip area and then adding a material deposit to the tip to form the tip to a desired dimension (paragraph [0005], lines 1-8). Note that the grinding step would make a cut-back in the tip area by removing the damaged portion.

Burke et al. teach a method of repairing a damaged gas turbine engine component such as an airfoil blade (18, Fig. 6) wherein depending on the severity of the damaged area, either a full length or only localized/partial sections are replaced/repared (col. 11, lines 5-11 and 27-32). Also, note that Burke et al. teach the repair is not only done on the damaged leading and trailing edges but also on the tip area extended from the leading edge to the trailing edge of the blade airfoil (col. 12, lines 13-15, Fig. 5).

Wang et al. in a method for repairing a damaged airfoil blade teach that it is well known in the art for a repair/replacement material and weld material to be the same as the blade material in order to facilitate the welding of the replacement material to the surface of the damaged blade material (col. 5, lines 20-28).

Flowers et al. teach a weld repair method of a damaged nickel-base superalloy (titanium alloy) gas turbine engine component such as an airfoil blade (20, Fig. 1) wherein an automated plasma-arc weld process is used to apply (deposit) weld material onto the damaged area (claims 1 & 9) of the blade.

It would have been obvious to one of ordinary skill in the art at the time of invention to have provided Randolph Jr. et al. with the repair of the outer tip portion as taught by AAPA including the necessary length and size of the repair as taught by Burke et al., in order to provide an effective way of replacing a worn or damaged tip area of a compressor blade.

It would have been further obvious to one of ordinary skill in the art at the time of invention to have provided Randolph Jr. et al./AAPA/Burke et al./Wang et al. with the

steps of measuring and determining the damaged area on the airfoil, comparing it with the pre-damaged areas, and determining the extensiveness of the repair needed in order to remove the damaged portion and provide the repair on the damaged portion based on the determined information in order to obtain a desired finish for each blade that would match the pre-damaged profile of the airfoil.

Note that Applicant (Remarks, page 1, lines 12-14, 19-22) submits that "one of ordinary skill in the art would have no difficulty in understanding the scope and meaning of "maximum chord reduction" in the context of the present invention as described in the specification" and that is known in the art, the "maximum chord reduction" defines a maximum chordwise limit as to an amount of leading edge and trailing edge cutbacks that can be made using the recited repair method for the airfoil to remain functional."

Furthermore, it is well known in the art that the ratio of the blade thickness to the chord (distance between the leading and trailing edges) of a blade airfoil should be within certain limits for the blade to be functional. Therefore, based on the above argument, the Examiner considers Applicant Admitted Prior Art (AAPA) that it would have been obvious to one of ordinary skill in the art, at the time of invention to have determine a maximum chordwise limit and a minimum blade thickness in order to determine how much cutbacks are allowed to be made on in repairing the leading and trailing edges of an airfoil such that the airfoil would remain functional.

In addition, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have provided the same weld material as the titanium blade material for the weld material of Randolph et al., as taught by Wang et al., in order to

repair and build up the damaged areas of the blade airfoil to obtain a pre-damaged profile, thereby replacing the worn and removed titanium portions with new titanium material.

Furthermore, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have used an automated plasma-arc weld process to deposit the weld material on the titanium blade of Randolph et al., as taught by Flowers et al., as an effective means of repairing and building up the damaged areas of the blade airfoil to obtain a pre-damaged profile, thereby replacing the worn and removed titanium portions with new titanium material.

5. As applied to claim 2, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein removing titanium alloy material further comprises machining away titanium alloy material along only the radially outermost portions of the leading and trailing edges extending from the tip towards a base of the airfoil (Fig. 3).

6. As applied to claim 3, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein machining away titanium alloy material along only the radially outermost portions of the leading and trailing edges further comprises forming a rounded corner between the leading edge and trailing edge cut-backs and un-machined portions of the airfoil extending between the leading and trailing edge outermost portions and the base of the airfoil (Fig. 3).

7. As applied to claim 4, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein forming a rounded corner between the leading edge and trailing edge cut-backs and un-machined portions of the airfoil further comprises forming a semi-circular corner that has a predetermined arc and radius of curvature (Fig. 3).

8. As applied to claim 5, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein machining away titanium alloy material along only the radially outermost portions of the leading and trailing edges further comprises machining away titanium alloy material along a length of about half a span of the airfoil between the tip and the base of the airfoil (Fig. 3).

9. As applied to claim 6, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein machining away titanium alloy material along only the radially outermost portions of the leading and trailing edges further comprises blending the titanium weld material (Fig. 3).

10. As applied to claim 7, Randolph Jr. et al./AAPA/Burke et al./Wang et al./ Flowers et al. teach a method wherein machining away titanium alloy material along only the radially outermost portions of the leading and trailing edges further comprises contouring the leading edge (Fig. 3).

Response to Arguments

11. Applicant's arguments with respect to claims 1-7 in a reply dated 7/28/2008 have been considered but they are not persuasive.

12. As for claims 1-7, rejected under 35 USC 103(a) as being unpatentable over Randolph Jr. et al. in view of AAPA and further in view of Burke et al., Applicant mainly presents the same argument as previously been addressed by the Examiner.

In regards to Applicant's argument (Remarks, page 1, last two paragraphs) that the Applicants have not been provided a citation to any reference supporting Official Notice made that "it was well known to a person of ordinary skill in the art, at the time of invention to have used titanium weld material to repair turbine components such as blades," the Examiner submits that indeed at the time of invention, it would have been obvious to one of ordinary skill in the art to have used the same weld repair material as the blade material (titanium blade of Randolph Jr. et al.) in view of Wang et al. teachings, since such weld repair would facilitate (provide a more coherent and effective) weld repair of the damaged blade.

As for the remainder of arguments, the Applicants argue that no combination of AAPA and Burke with Randolph et al. describes or suggests the steps recited in claim 1-7. The Examiner once again reiterates that AAPA is only relied upon to show that it is well known in the art to remove a damaged area of the tip and then adding material deposit to the tip and Burke is only relied upon to teach that it is well known in the art to repair/replace a full length or only localized/partial sections on leading, trailing and tip

areas of an airfoil. The newly applied art of Flowers et al. is used to teach that using an automated plasma-arc weld process is well-known in the art and as such, there is valid motivation, suggestion and teaching of the desirability of making the specific combination.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SARANG AFZALI whose telephone number is (571)272-8412. The examiner can normally be reached on 7:00-3:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bryant can be reached on 571-272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sarang Afzali/
Examiner, Art Unit 3726
11/12/2008

/DAVID P. BRYANT/
Supervisory Patent Examiner, Art Unit 3726